Universal Intelligent Controller

UIC-DX270 for Screw Compressor

2006-Apr rev. 1

Application: Chiller, CDU, Spot Cooler

Compressor Maker: Bitzer, Roltec, Fusheng, Hanbell, Refcomp, Hitachi, Mitubishi, Etc

DOTECH, INC

Joongang-ilbo building 6F, Wonsi-dong, Danwon-gu

Ansan-si, Gyeonggi-do, KOREA

Tel **: 031-495-3767 , 031-495-3916 (Customer Service Center)**

Fax **: 031-495-3917 *Homepage* : www.dotech21.com**

E-mail **: business@dotech21.com**

※ Certainly read 'warning matter for safety', and please use before using.

▣ Warning matter for safety

This direction is for using the product correctly so that you could be safe from danger or incident.

Please carefully keep this all direction.

- Please use with being attached to a dual safety device in case of using for controlling instruments which could be effective to human life or property (ex: controlling atomic energy, medical instruments, cars, trains, flights, burners, amusement instruments or safety machinery).
- Please use with panel, there is a possibility getting an electric shock.
- **Do not inspect or test with connecting power.**
- **Please connect after checking the terminal number when connecting power.**
- Do not reorganize except mechanic from DOTECH.
- Do not use outdoor. It would be a cause making the product life shorter.
- When connecting wires, please give a good screw on terminal. There is a possibility causing a fire with bad connection.
- Please use in the proper performance zone. If you don't, there is a possibility making the product life shorter or, causing a fire accident.
- Do not use a load which is exceeded proper value of opening and shutting capacity of a relay contact. This will cause bad insulation, bad contact and bad connection.
- When cleaning, water or liquid including oil are prohibited, only clean with soft and dried cloth.
- Do not use in the place where there is inflammability gas, explosiveness gas, moisture, a direct ray of light, radiation, vibration and a shock.
- Please prevent from getting a dirt or leftover wire inside of this product.
- When connecting a sensor, please connect correctly after checking the polarity.

Some of the setting, size etc. on this manual could be changed without an advance notice.

Warranty Information

This is the warranty below for customer who has a license or product from DOTEC.

The condition of warranty

The warranty period for DOTECH products is a year so that it is provided support of the product during the warranty period.

『DOTECH does not have a responsibility for problems of product under the circumstance below.

In the case of using without concerning the proper form mentioned on the manual.

In the case of problems caused from both external artificial and environmental factors.

Please contact DOTECH in advance if there is any problem of product caused during the warranty period.

If the problem of product is informed from customer in the warranty period, it will be checked up in the customer area or sent to DOTECH to check and conduct repair of exchange services directly. If the product is over the warranty period or that is on the condition that it is not mentioned on manual, customer would be suggested to pay the cost of repair, exchange and delivery.

On the condition that suggestions for 'Warranty Condition Performance' below are not against the law, DOTECH is not responsible for any compensation and guarantee caused by losses or damages by business interruption, loss, return.

Warranty Condition Performance

DOTECH is not responsible for any loss, damages, expenses insisted by customer, delegate, contractor except for customer claims caused by the condition of warranty above.

The condition of warranty mentioned above is the exclusive customer's right. DOTECH refuses any conditions of warranty for special purpose except for the condition of warranty.

Warranty Condition Performance does not apply any trouble caused by not following exact direction. It is responsibility for customer to decide usage or product.

All the conditions of warranty are actually applied and Nobody has authority to modify or extend.

INDEX

1. OUTLINE 8

1) SPECIAL MERITS 9

1-1) Countermeasure of the Noise 9

1-2) RISC TYPE MICOM 9

1-3) Black box built-in: Operation recording system built-in 9

1-4) Display of operating state 9

1-5) Adoption Wide LCD Graphic (Wide Temperature Range Type : -20 ~ +70℃) 9

1-6) Miniaturization, Slimmerlization 9

1-7) Expandability 9

2) BASIC FEATURES 10

2-1) General feature 10

2-2) CPU and LCD 10

2-3) Digital input/output 10

2-4) Analog input/output 10

2-5) Communication feature 10

2-6) Installation features 10

2. INPUT/OUTPUT FEATURE 11

1) DIGITAL INPUT SIGNAL 11

2) DIGITAL OUTPUT SIGNAL 12

3) ANALOG INPUT SIGNAL 13

4) ANALOG OUTPUT SIGNAL (OPTIONAL FUNCTION) 14

5) COMMUNICATION SIGNAL (OPTIONAL FUNCTION) 15

5-1) SYSTEM BUS 15

5-2) LOCAL BUS 15

6) CONTROL POWER INPUT 16

3. COMPOSITION 17

1) OPERATION AND DISPLAY 17

1-1) General composition 17

1-2) Operation 17

1-3) Setting up program 17

2) OUTLINE DRAWING AND PROCESSING 18

3) DISPLAY OF OPERATING STATE 19

4) FUNCTION OF AN OPERATION BUTTON 19

5) STATE DISPLAY LAMP 19

6) SYMBOL EXPLANATION 21
6-1) Equipment state display **21**
6-2) Digital input signal symbol **22**
6-3) Digital output signal symbol **22**
4. MENU COMPOSITION **23**
1) OPERATION AND DISPLAY 23
2) MENU STRUCTURE 24
3) MENU ACCESS LEVEL 25
4) RUN INFORMATION 26
5) OPERATION 26
6) SCHEDULE OPERATION 27
7) TRIP LOG 28
8) TRIP AND ALARM 29
8-1) Trip alarm message **30**
9) EXTENT OPERATING SET 32
10) CONFIGURE 33
11) CALIBRATION 34
12) TEST MODE 35
13) FACTORY SET 36
14) SYSTEM DATE/TIME 37
5. INSTALLATION PROCESS **38**
1) INSTALLATION PLACE 38
2) INSTALLATION PROCESS 38
3) BE WARNING MATTERS ACID CONNECTION WITH LINES 38
6. ELECTRIC DRAWING **39**
7. SENSOR DATA **40**
1) TEMPERATURE SENSOR DATA 40

※ Please check the product to the model ordering before usage.

Model	Suffix Code			Description
DX270	-	-	-	UIC for Screw Compressor (Chiller, CDU)
Type	-	0	0	None
	-	1	0	Analog Output 3 Channel (Temperature Retransmission)
	-	0	1	With Communication RS-485 Mod-Bus
Language	-	-	-	Korean
	-	E	-	English
	-	C	-	Chinese

- **Elements**

DX270body ---- 1

DX270 only connector (4mm nut 4 included)

DX270-00 : (3P-1, 4P-1, 5P-4, 6P-2) ---- 1set

DX270-01 : (3P-2, 4P-1, 5P-4, 6P-2) ---- 1set

DX270-10 : (3P-1, 4P-1, 5P-4, 6P-3) ---- 1set

DX270-11 : (3P-2, 4P-1, 5P-4, 6P-3) ---- 1set

DX270 exclusive trans (P/N:24069001) ---- 1 (separately purchase)

Temperature sensor (DPR-TH2-06D100L) : Discharge gas temperature (separately purchase)

Temperature sensor for DX270 (DPR-TH1-06D100L) : Exit temperature (separately purchase)

Freezing exclusive use pressure sensor (-1 ~ 9 bar) (separately purchase)

Freezing exclusive use pressure sensor (0 ~ 30 bar) (separately purchase)

※ Product Reference

DX200 : 1 C/S Screw Chiller / Controlling CPU

DX220 : 1~2 C/S Screw Chiller / Controlling CPU

DX240 : 1~4 C/S Screw Chiller / Controlling CPU

DX260 : Multi Compressor Controller / Be control possibility with a unit number.

DX270 : 1 C/S Screw Chiller / CDU control (Controlling steps)

DX230 : 1~2 C/S Round-trip/ Screw Chiller / Controlling CPU

DX230H : 1~2 C/S Round-trip / Controlling scroll hit pump

DX100 : Controlling Air handling unit

DX140 : Controlling stable temperature and humidity

1. OUTLINE

UIC-DX270 is based on microprocessor, and be control devices electronic the high-tech carrying out an efficient driving of a screw compressor. UIC-DX270 is managing intensively a driving of a compressor, and be systems attempt an energy-saving, or affect an alarm, and prevent previously the occurrence in question, and informing necessary maintenance information as judgment controls capacity coordination timing. Correct it, and UIC-DX270 carries automatically out the best operation (control) according to operation situations of condition and a machine set up. Besides, UIC-DX270 possesses the following tip function with bases, and can efficiently operate further a compressor.

- ▣ **Reliability adopted high RISC MICOM.**
- ▣ Adopted **wide graphic LCD** displaying Korean/English/Chinese.
- ▣ Easy analyze the cause of troubles because of storing **160 histories** of Trip Warning (nonvolatile).
- ▣ A weekly timer is built, and automation can call a **saving operating**.
- ▣ **Variety analog output** (transfer exit temperature, discharge gas temperature)
- ▣ **Various product coverage** (chiller, CDU, starting controller).
- ▣ **One touch setting**: Capacity control method setting is possible.
  (Bitzer, Roltec, Fusheng, Hanbell, Refcomp, Hitachi, Mitubishi, etc.)

(S-Series screw compressor made by Refcomp LTD.)

1) SPECIAL MERITS

UIC-DX270 supports a Korean display and trip alarm personal history for integrated controls and management of a screw freezer, and be electronic control unit this only an excellent screw freezer having been equipped with stability. Were adopting a digital algorithm process method by microprocessor of highly efficient RISC type, and a unification did modular a display control module, and ensured a mounting space and stability. Delivery calls immediately a driving situation to users to a display, and can provide convenience such as operation and maintenance etc.

1-1) Countermeasure of the Noise

A piece regarding noise measures will be the urea which is essential as controllers for industry. The digital input/output signal the noise measures that isolation, an external signal does not flow into into boards are all prepared. And the acid **hardware watch dog timer** which is restored automatically like CPU by noises dislikes 32msec, and be operating to CPU of a board, A brown-out function becomes an innards, and be monitoring the control power in the CPU inside by real time.

1-2) RISC TYPE MICOM

The assembly instruction code of CPU conducts 7.3738M instruction per second, controlling logic writing on CPU spends about 1[msec] per cycle. Thus, it is less possibility to make trouble and much detailed to control than normal controller.

1-3) Black box built-in: Operation recording system built-in

DX - 270 can save up to 160 events of trip warning background so that it is great to analyze trouble maintain the product. Additionally, users can know the state of operation on the spot easily during trip.

1-4) Display of operating state

Have driving state of an air compressor and a function marking delay time and atmosphere time, and DX 270 series can try to know at first sight driving state of a compressor.

1-5) Adoption Wide LCD Graphic (Wide Temperature Range Type : -20 ~ +70℃)

The display of UIC-DX270 an equipment user adopted large graphical LCD so that operation and recognition were easily possible. (*English, Korean, Chinese*) Display of UIC-DX-270

1-6) Miniaturization, Slimmerlization

Main control wealth and display addition unification is favorable to a space security.

1-7) Expandability

RS485 port assistance, Modbus RTU standard protocol assistance, MMI Software and automatic interface assistance.

2) BASIC FEATURES

2-1) General feature

Power Conditions	Input power	AC24V 50/60Hz, DC24V
	Output power	20VA(Maximum)

2-2) CPU and LCD

CPU, LCD	C P U	ATmega 128, 16MHz
	L C D	240 X 128 pixel, LED Backlight

2-3) Digital input/output

Digital Input	Input Method	Opto-Isolation
	Number of Input	10 (5 X 2 Common)
	Signal Power	AC24V or DC24V
Digital Output	Output Method	Relay contact
	Number of Output	12, (4 X 3 Common)
	Relay Contact	250V, 10A (NAIS JQ1P Series)

2-4) Analog input/output

Analog Input	Temperature Sensor	NTC 3
	0~1VDC, 4~20Madc	2 (sensor power 24V)
	Declination Revision	Software
Analog Output	Number of Channel	3 channel
	Output Method	4~20mA
	Setting Form	software

2-5) Communication feature

Communication	Communication Method	RS485(half-duplex), 2 Channel
	Communication Speed	4800, 9600, 19200, 38400 BPS Parity None, Data 8bit, Stop 1bit
	Communication Distance	1.2Km (maximum)
	Suggested Cable	BELDEN 9841(2) or 8761

2-6) Installation features

Field Conditions	Install Place	Indoor
	Operation Temperature	-10 ~ 60 ℃
	Storage Temperature	-30 ~ 80 ℃
	Operation Humidity	Non-humidity 5~95%

2. INPUT/OUTPUT FEATURE

1) DIGITAL INPUT SIGNAL

Pin	Name	Function	Active state
J13.1	ID1	Over-load Main Motor	fault (open)
J13.2	ID2	Reverse-Phase Main Motor	fault (open)
J13.3	ID3	Low-Pressure Switch Signal	fault (open)
J13.4	ID4	High-Pressure Switch Signal	fault (open)
J13.5	ID5	Oil Level Switch Signal	fault (open)
J13.6	IDCM1	Input common terminal 1	

Pin	Name	Function	Active state
J14.1	ID6	INT • Oil Flow Signal	fault (open)
J14.2	ID7	Condenser Fan Fault Signal	fault (open)
J14.3	ID8	Flow Signal-Pump(Fan) Interlock	fault (open)
J14.4	ID9	Over-load Pump(Fan) Motor	fault (open)
J14.5	ID10	Remote Start/Stop Control	Run (closed)
J14.6	IDCM2	Input common terminal 2	

2) DIGITAL OUTPUT SIGNAL

Pin	Name	Function	Active state
J21.1	N1	Load Control Capacity SOL V/V (CR1)	ON
J21.2	N2	Load Control Capacity SOL V/V (CR2)	ON
J21.3	N3	Load Control Capacity SOL V/V (CR3)	ON
J21.4	N4	Liquid SOL V/V	ON
J21.5	C1	Output common terminal 1	

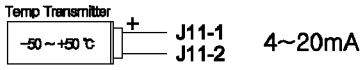
Pin	Name	Function	Active state
J22.1	N5	MC for Main / PW1	ON
J22.2	N6	MC for Start / PW2	ON
J22.3	N7	MC for Delta	ON
J22.4	N8	Liquid Injection Sol V/V Control	ON
J22.5	C2	Output common terminal 2	

Pin	Name	Function	Active state
J23.1	N9	Load Control Capacity SOL V/V (CR4)	
J23.2	N10	Run State Signal	Run (ON)
J23.3	N11	Total Alarm Signal	Alarm (ON)
J23.4	N12	Pump(Fan) On/Off Signal	ON
J23.5	C3	Output common terminal 3	

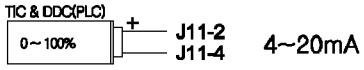
3) ANALOG INPUT SIGNAL

Pin	Name	Function	Type	Range
J11.1	+24V	Sensor power (+V common)		
J11.2	B4	Pressure sensor / temperature sensor/Capacity control input	4 ~ 20mA	Possible to set
J11.3	B5	Pressure sensor / temperature input	4 ~ 20mA	Possible to set
J11.4	AVSS	0V common(GND wire of Shield Wire)		

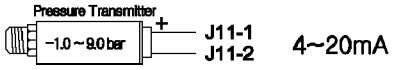
※ External Temperature Sensor Input



※ External Capacity Control Input



※ Low Pressure Sensor Control Input



Pin	Name	Function	Type	Range
J12.1	B1	Inlet port temp-sensor input	NTC 5K	-40 ~ 70 ℃
J12.2	AVSS			
J12.3	B2	Outlet port temp-sensor input	NTC 5K	-40 ~ 70 ℃
J12.4	AVSS			
J12.5	B3	Discharge Gas Temp. Sensor	NTC 10K	-20 ~ 200 ℃

4) ANALOG OUTPUT SIGNAL (OPTIONAL FUNCTION)

Pin	Name	Function	Type
J6.1	Y1	Entrance Temp. Signal (+)	4 ~ 20mA
J6.2	YG1	Entrance Temp. Signal (-)	
J6.3	Y2	Exit Temp. Signal (+)	4 ~ 20mA
J6.4	YG2	Exit Temp. Signal (-)	
J6.5	Y3	Discharge Gas Temp. Signal (+)	4 ~ 20mA
J6.6	YG3	Discharge Gas Temp. Signal (-)	

* Entrance Temperature Signal Range: 4 ~ 20mA (-30.0 ~ 70.0 ℃)
* Exit Temperature Signal Range: 4 ~ 20mA (-30.0 ~ 70.0 ℃)
* Discharge Gas Temperature Signal Range: 4 ~ 20mA (0.0 ~ 200.0 ℃)

5) COMMUNICATION SIGNAL (OPTIONAL FUNCTION)

5-1) SYSTEM BUS

Pin	Name	Function	Type
TB1.1	GND	-	RS-485
TB1.2	B	SYSTEM BUS TRX-	
TB1.3	A	SYSTEM BUS TRX+	

5-2) LOCAL BUS

Pin	Name	Function	Type
TB2.1	GND	-	RS-485
TB2.2	B	LOCAL BUS TRX-	
TB2.3	A	LOCAL BUS TRX+	

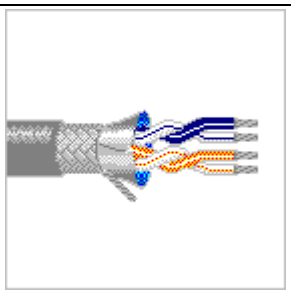
※ Communication feature (System Bus, Local Bus)

① Communication Method : RS-485

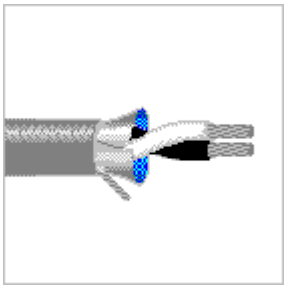
② Communication Speed : 4800, 9600, 19200, 384000 BPS, N, 8, 1

③ Communication Protocol : MODBUS RTU MODE

④ Communication Cable(suggested) : BELDEN 9842 or 8761



(9842)



(8761)

BELDEN 9842 Paired- Low Capacitance EIA RS-485

⊙ Number of Pairs: 2

⊙ Total Number of Conductors: 4

⊙ AWG: 24

⊙ Stranding: 7x32

⊙ Conductor Material: TC - Tinned Copper

⊙ Insulation Material: PE - Polyethylene

⊙ Outer Shield Material Trade Name: Beldfoil®

⊙ Outer Shield Material: Aluminum Foil-Polyester Tape/TC –

⊙ Tinned Copper

⊙ Outer Jacket Material: PVC - Polyvinyl Chloride

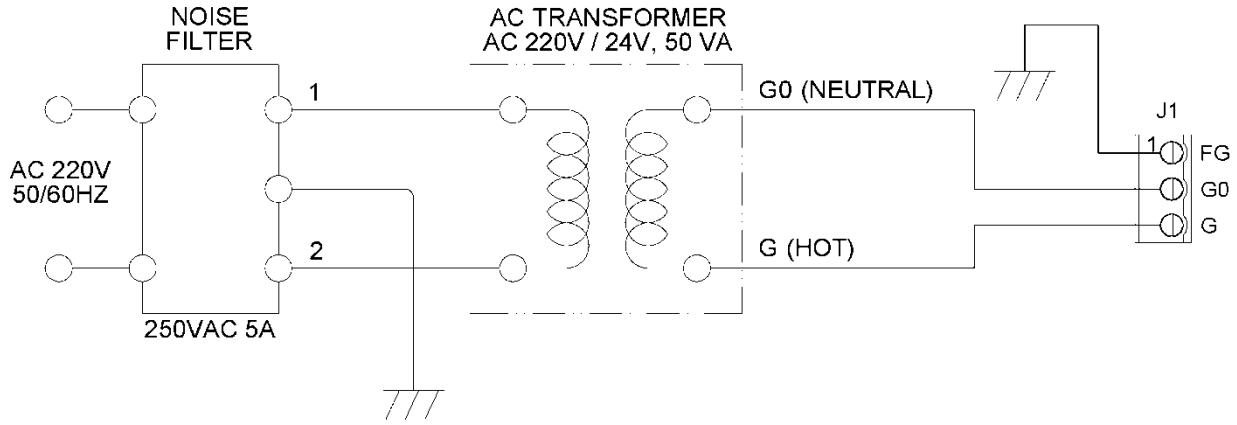
⊙ Plenum (Y/N): N ⊙Plenum Number: 82842

⊙ Applications: Computer Cables, Low Capacitance EIA RS-485

※ BELDEN 9842 is recommended.

6) CONTROL POWER INPUT

Pin	Name	Function	Type
J1.1	FG	FIELD GROUND (CASE SHIELD)	
J1.2	G0	AC24V(-) or DC24V(-)	
J1.3	G	AC24V(+) or DC24V(+)	



3. COMPOSITION

1) OPERATION AND DISPLAY

1-1) General composition

Display: 240 X 128 Graphic LCD (LED BACKLIGHT), LED Green 1, Red 1

Keyboard: 8 main switches

1-2) Operation

Start Switch: Start

Stop Switch: Stop

Reset Switch: Reset during trip

Green lamp: Lamp showing the state of operation

Red lamp: Lamp showing the warning or bad trip

1-3) Setting up program

Choice Switch: Choose the program or value

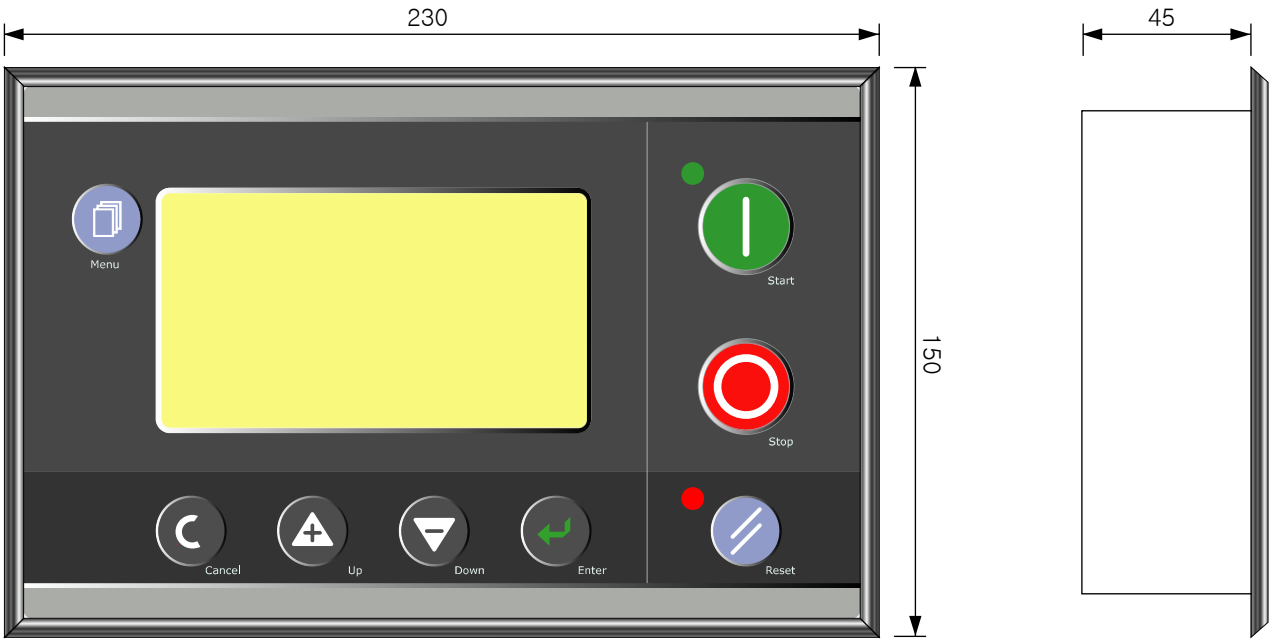
Down Switch: Control down movement

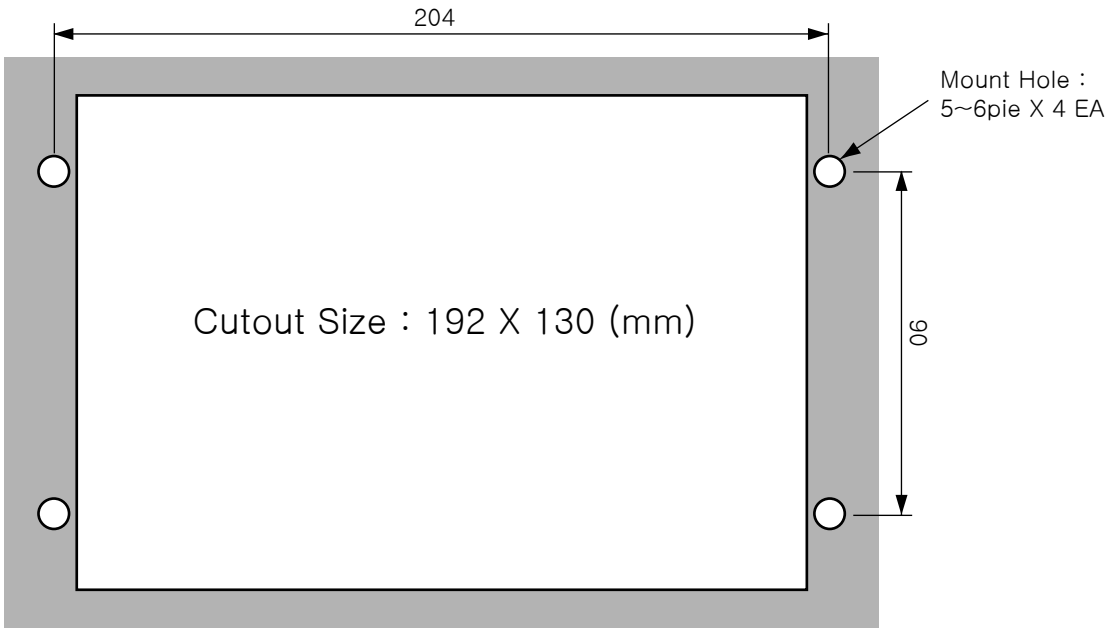
Up Switch: Control up movement

Menu Switch: Call menu

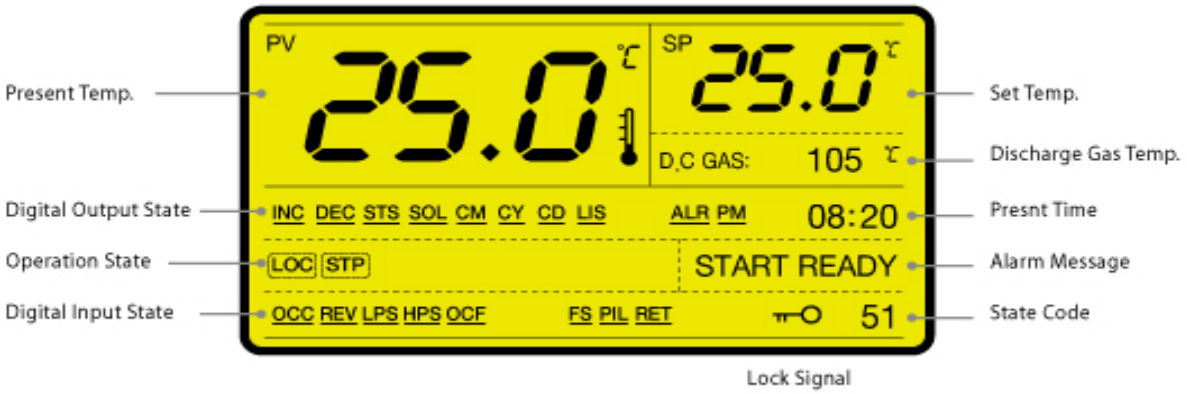
Return Switch: Return to previous menu or the first menu

2) OUTLINE DRAWING AND PROCESSING





3) DISPLAY OF OPERATING STATE



4) FUNCTION OF AN OPERATION BUTTON

Start/Stop		Start or Stop Start when putting the start button Stop when putting the stop button
Reset		Reset during trip The Trip having automatic reset function will reset automatically without putting the button
Menu		Menu button to set for a control and state
Enter		Choose or Save button
Up / Down		Up/ Down
Cancel		Return to previous menu or first menu

5) STATE DISPLAY LAMP

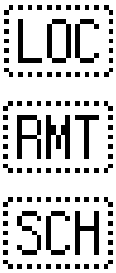
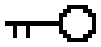
Operation state lamp	**Green**	Operating ON / OFF
Alarm state lamp	**Red**	Alarm ON / OFF

ON: LED is on always, OFF: LED is not on always.
Low speed flickering: ON for 0.5sec, OFF for 0.5sec
High speed flickering: ON for 0.1sec, OFF for 0.1sec
Spot flickering: ON for 0.1sec, OFF for 4sec

State No.	State	Operation State Lamp	Alarm State Lamp
0	Initialization	OFF	Normal: OFF Trip: High speed flickering Alarm: Low speed flickering
1	Inhibit check	OFF	
2	Start ready	OFF	
3	Timer Value Initialization	OFF	
4	Pump (fan) start delay	High speed flickering	
5	Pump(fan) start	High speed flickering	
6	Waiting operation	High speed flickering	
7	Capacity control value Initialization	High speed flickering	
8	Comp. Operation Delay	High speed flickering	
9	Comp. Start	High speed flickering	
10	Start sol off Delay	ON	
30	Comp. Manual Stop Delay	Low speed flickering	
31	Pump Down Delay	Spot flickering	
32	Restart Delay	Low speed flickering / Spot flickering	
40	Pump(Fan)off Delay	Spot flickering	
41	Pump(Fan) off	Low speed flickering / Spot flickering	
50	Capacity Maintenance Operation	ON	
51	Capacity Decrease Operation	ON	
52	Capacity Increase Operation	ON	
53	Comp. Auto Stop Delay	Low speed flickering	
99	Shut-Down	OFF	

6) SYMBOL EXPLANATION

6-1) Equipment state display

	**Start/Stop Mode State Signal** LOC: Control Start/Stop button on the body RMT: Remote controlling start/stop SCH: Pre-organized start/stop on the Operation schedule Setting Menu
	Start/Stop Signal RUN: Start or in Process STP: Stop
	**System Lock Signal**

6-2) Digital input signal symbol

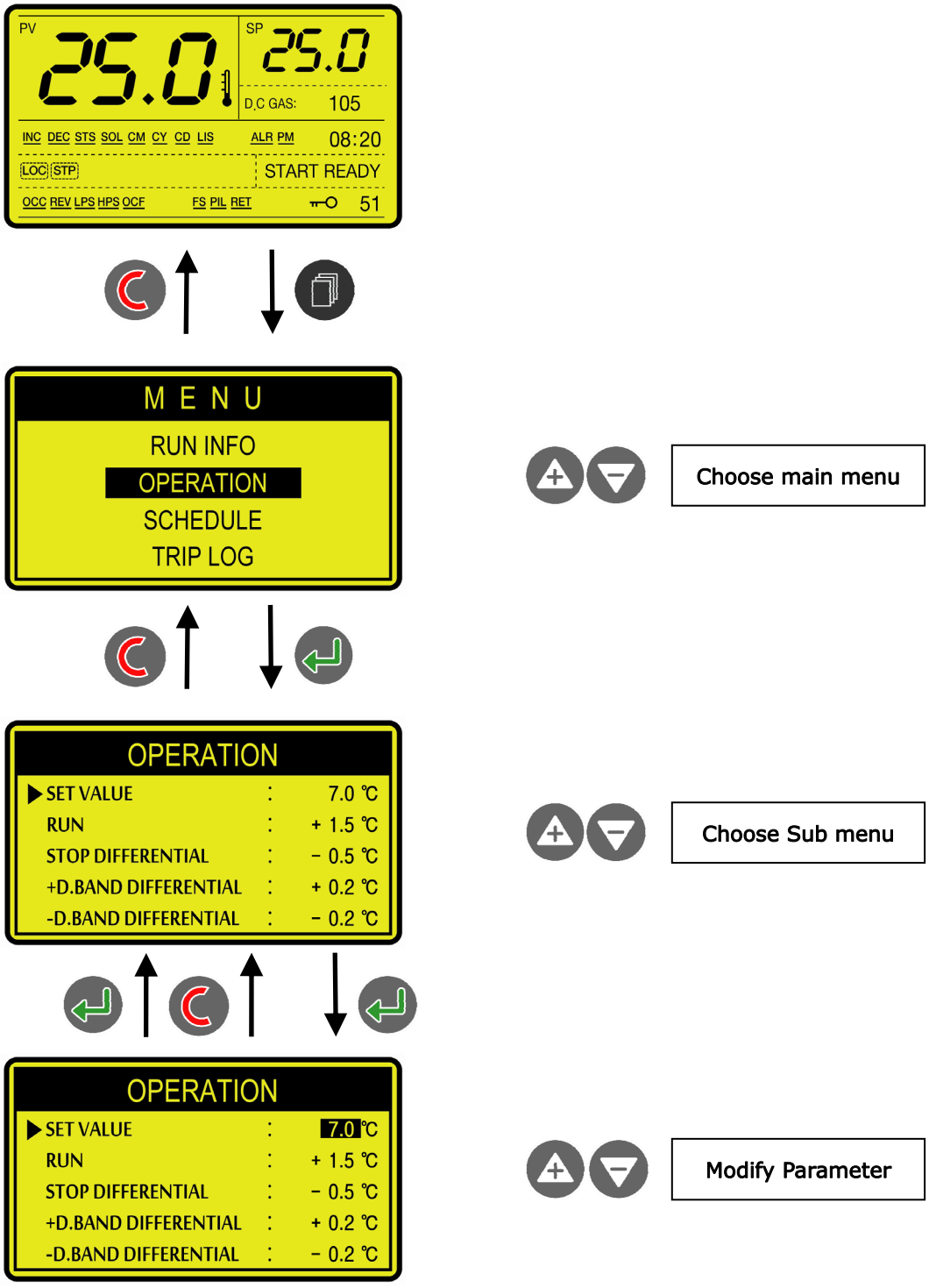
Symbol	Description	Symbol	Description
OCC	Over-load Main Motor	OVH	Over-heat Compressor Signal
REV	Reverse-Phase Main Motor	OCF	Condenser Fan Fault Signal
LPS	Low-Pressure Switch Signal	FS	Flow Signal -Pump(Fan) Interlock
HPS	High-Pressure Switch Signal	PIL	Over-load Pump(Fan) Motor
OLS	Oil Level Switch Signal	RET	Remote Start/Stop Control
OFS	Oil Flow Switch Signal		

6-3) Digital output signal symbol

Symbol	Description	Symbol	Description
S1%	Load Control Capacity SOL V/V (CR1)	CM	Main Magnetic Contactor
S2%	Load Control Capacity SOL V/V (CR2)	CY	Star Magnetic Contactor
S3%	Load Control Capacity SOL V/V (CR3)	CD	Delta Magnetic Contactor
SOL	Liquid SOL V/V	P1	PW1 Magnetic Contactor
LIS	Liquid Injection Sol V/V Control	P2	PW2 Magnetic Contactor
ALR	Total Alarm Signal	PM	Pump(Fan)Motor Control Signal

4. MENU COMPOSITION

1) OPERATION AND DISPLAY



2) MENU STRUCTURE

RUN INFO

- 00: INLET TEMP
- 01: OUTLET TEMP
- 02: DISCHARGE GAS
- 03: RUN HOUR
- 04: COMPS RUN HOUR
- 05: COMPS ON/OFF

OPERATION

- 00: SET VALUE
- 01: RUN DIFFERENTIAL
- 02: STOP DIFFERENTIAL
- 03: 50%CAP.DIFFERENTIAL
- 04: 75%CAP.DIFFERENTIAL
- 05: ⊕D.BAND DIFFERENTIAL
- 06: ⊖D.BAND DIFFERENTIAL
- 07: INJECTION SET VALUE
- 08: INJECTION DIFFERENTIAL
- 09: LCD BACKLIGHT MODE

SCHEDULE

- 00:SUN : ON ~ OFF
- 01:MON : ON ~ OFF
- 02:TUE : ON ~ OFF
- 03:WED : ON ~ OFF
- 04:THU : ON ~ OFF
- 05:FRI : ON ~ OFF
- 06:SAT : ON ~ OFF

TRIP LOG

- EVENT #1
- EVENT #2
- EVENT #3
- |
- EVENT #160

TRIP AND ALARM

- 00: FLOW SENSING DELAY
- 01: FLOW SENSING HOLD
- 02: DISCHARGE TEMP. OVER
- 03: OUTLET TEMP FREEZE
- 04: OIL FLOW SENSING DELAY
- 05: OIL FLOW SENSING HOLD
- 06: LOW PRESS SENSING DELAY
- 07: LOW PRESS SENSING HOLD
- 08: OIL LEVEL SENSING DELAY
- 09: OIL LEVEL SENSING HOLD
- 10: CONDENSOR FAULT FUNC.

EXTENTION

- 00: RUNNING MODE
- 01: CONTROL SOURCE
- 02: STEP DELAY TIME
- 03: STEP DELAY TIME (STRAT)
- 04: COMP. STRAT DELAY TIME
- 05: COMP. AUTO STOP DELAY
- 06: COMP. STOP DELAY TIME
- 07: START SOL OFF DELAY
- 08: PUMP(FAN) OFF DELAY
- 09: Y/D,P/W CHANGE TIME
- 10: PUMP-DOWN DELAY TIME
- 11: BLACKOUT RETURN FUNC.

CONFIGURE

- 00: COMP START METHOD
- 01: INLET TEMP SENSOR
- 02: OUTLET TEMP SENSOR
- 03: DISCHARGE TEMP SENSOR
- 04: INJECTION SOL TYPE
- 05: START CAPCITY METHOD
- 06: 50% CAPCITY METHOD
- 07: 75% CAPCITY METHOD
- 08: 100% CAPCITY METHOD

CALIBRAITION

- 00: INLET TEMP SENSOR CAL.
- 01: OUTLET TEMP SENSOR CAL
- 02: DISCHARGE SENSOR CAL

TEST MODE

- 00: MANUAL TEST MODE
- 01: CR1 CAPACITY SOL
- 02: CR2 CAPACITY SOL
- 03: CR3 CAPACITY SOL
- 04: MAIN LIQUD SOL
- 05: COMPS MM•PW1
- 06: COMPS MY•PW2
- 07: COMPS MD
- 08: INJECTION SOL
- 09: SPARE
- 10: RUN STATE
- 11: TOTAL ALARM
- 12: PUMP(FAN) CONTROL

FACTORY SET

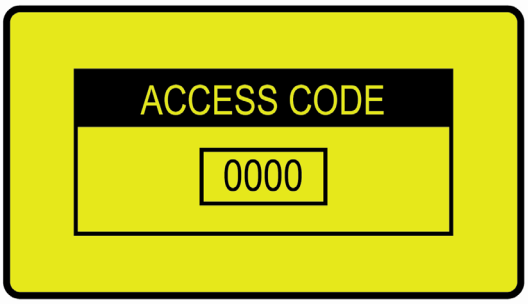
- 00: SELF TEST
- 01: LOG CLEAR
- 02: INFO CLEAR
- 03: B1 INPUT
- 04: B2 INPUT
- 05: B3 INPUT
- 06: B4 INPUT
- 07: B5 INPUT
- 08: B4 4mA SET
- 09: B4 20mA SET
- 10: B5 4mA SET
- 11: B5 20mA SET
- 12: Y1 4mA SET
- 13: Y1 20mA SET
- 14: Y2 4mA SET
- 15: Y2 20mA SET
- 16: Y3 4mA SET
- 17: Y4 20mASET
- 18: ADC FILTER
- 19: DAC FILTER

3) MENU ACCESS LEVEL

Access Level	USER 2 (CODE = 0009)	SERVICE 1 (CODE = 0100)	SERVICE 2 (CODE = 0119)	SERVICE 3 (CODE = ****)
Accessible Menu	1. Run info. 2. Operation 3. Trip log 4. Calibration	1. Run info. 2. Operation 3. Schedule 4. Trip log 5. Trip and alarm 6. Extention 7. Configure 8. Test mode	1. Run info. 2. Operation 3. Schedule 4. Trip log 5. Trip and Alarm 6. Extention 7. Configure 8. Calibration 9. Test mode	1. Run info. 2. Operation 3. Schedule 4. Trip log 5. Trip and Alarm 6. Extention 7. Configure 8. Calibration 9. Test mode 10. Factory set
Maintenance Time	1 min.	10 min.	30 min.	1 hour

When changing Access Level Mode, make locked by putting Cancel button for 3 sec.

1) If putting [Menu] on operating display, it shows access code input display below.
   (If putting [Menu] during supporting time, it does not ask Access Code.)
2) After input Access Code by [Up]/[Down] key, put [Enter] and then, convert to Menu display.



<Access code input screen>

3) Before maintenance time, put [Cancel] key for 3 min. for Locked Mode.

4) RUN INFORMATION

Item	Description	Units	Step	Min	Max	Default	View	Access
000	Inlet Temp.	℃	0.1	-40.0	70.0	View only	USER 1	-
001	Outlet Temp.	℃	0.1	-40.0	70.0	View only	USER 1	-
002	Discharge Gas Temp.	℃	1	0	180	View only	USER 1	-
003	Run hour	h	1	0	99999	0	USER 1	SVC 2
004	Comps run hour	h	1	0	99999	0	USER 1	SVC 2
005	Comps on/off	number	1	0	99999	0	USER 1	SVC 2

1) Over 99999 Operation Time or Number, it is initialized '0' automatically.

2) Operation Time or Number could be changed over Service Level 2.

5) OPERATION

Item	Description	Units	Step	Min	Max	Default	View	Access
100	**Set value**	℃	0.1	-99.9	99.9	7.0	USER2	USER2
		Bar				2.0		
		%				20.0		
101	**Run differential**	℃	0.1	+0.1	+50.0	+5.0	USER2	USER2
		Bar				+2.0		
		%				+30.0		
102	**Stopping differential**	℃	0.1	-50.0	0.0	0.0	USER2	USER2
		Bar				0.0		
		%				0.0		
103	**50% cap.differential**	℃	0.1	0.0	+50.0	+1.0	SVC1	SVC1
		Bar				+0.5		
		%				+10.0		
104	**75% cap.differential**	℃	0.1	0.0	+50.0	+2.0	SVC1	SVC1
		Bar				+1.5		
		%				+20.0		
105	**⊕D.Band differential**	℃	0.1	0.0	+20.0	+0.2	SVC1	SVC1
		Bar				+0.1		
		%				+2.0		
106	**⊖D.Band differential**	℃	0.1	-20.0	0.0	-0.2	SVC1	SVC1
		Bar				-0.1		
		%				-2.0		
107	**Injection set value.**	℃	1	0	180	100	SVC1	SVC1

108	**Injection differential**	℃	1	-50	-1	-10	SVC1	SVC1
109	**LCD backlight Mode**	On / Off				Off	USER2	USER2

※ **According to the control objects that set up in operation menus, Unit (℃,bar,%) is changed**.

1) Set value: Input a standard of freezer control.
2) Run differential: Input condition that a freezer operate.
   (ex, 7.0+5.0=12.0 If it is a more than 12, be operating start.)
3) Stopping differential: Input condition that a freezer stops.
   (ex, 7.0-0.0=7.0 If it is 7 or below, be operating stop)
4) Injection control temperature and differential: Input a temperature control section of a inject valve.
   (ex, Be OFF . at ON, 90 degrees or below at 100 degrees ideal)
5) LCD backlight mode: On(always On), Off(In case of the alarm On, Be automatic off. On in case of button operation 60 seconds later)

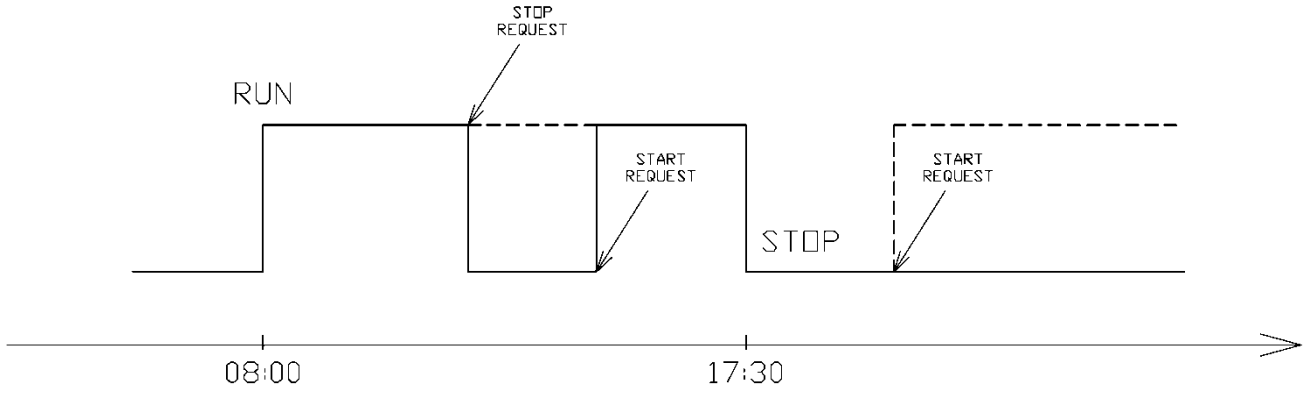
6) SCHEDULE OPERATION

Item	Description	RUN ~ STOP
400	SUN	00 : 00 ~ 00 : 00
401	MON	08 : 30 ~ 18 : 30
402	TUE	08 : 30 ~ 18 : 30
403	WED	08 : 30 ~ 18 : 30
404	THU	08 : 30 ~ 18 : 30
405	FRI	08 : 30 ~ 18 : 30
406	SAT	08 : 30 ~ 12 : 30

※ It is displayed when setting to reservation Operation from expanded operation.

1) Operate at the set time, stop at the set time.
2) Equipment is operating automatically during operating time and stops during stop time.
3) If it does not need to operate on exact day, set Operating Time and Stop Time equally.
4) If Operating Time is after stop Time, equipment does not work.
5) During schedule Operation, it is possible to control with [Operation] key and [Stop] key.
   (Picture below)
6) After Stop Time, it does not operate by putting [Operation] key.(Picture below)

7)



7) TRIP LOG

Item	Date	Time	Occur/Reset	Event
1	Y Y / M M / D D	H H : M M	(X)	The name of Trip warning #1
2	Y Y / M M / D D	H H : M M	(X)	The name of Trip warning #2
3	Y Y / M M / D D	H H : M M	(X)	The name of Trip warning #3
4	Y Y / M M / D D	H H : M M	(X)	The name of Trip warning #4
5	Y Y / M M / D D	H H : M M	(X)	The name of Trip warning #5
|	|	|	|	|
|	|	|	|	|
160	Y Y / M M / D D	H H : M M	(X)	The name of Trip warning #160

※ It is not possible to modify or erase log.

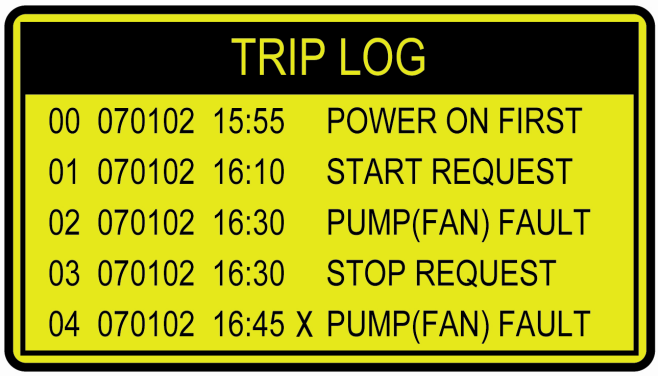
① If Trip Warning occurs (cancel), event date and the name of trip warning is saved in nonvolatile memory.

② Maximum is 160, it is deleted and saved previous events over 160 events.

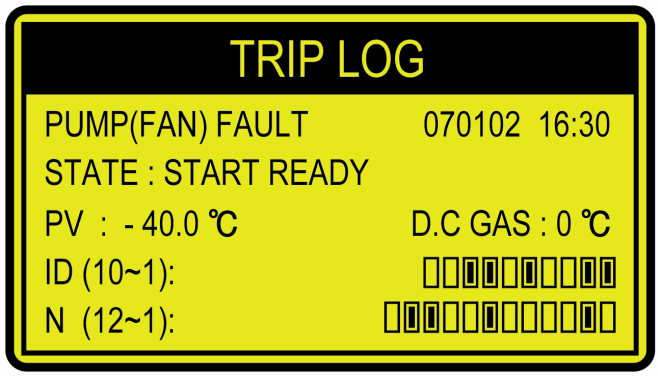
③ When occurring, date, time, event (trip warning) are recorded, when canceling, 'X' is showed next to time.

④ If putting [Enter], Operation state Code, Exit Pressure, Exit Temp., and Surrounding Temp. Are showed.

⑤


TRIP LOG
00 070102 15:55 POWER ON FIRST
01 070102 16:10 START REQUEST
02 070102 16:30 PUMP(FAN) FAULT
03 070102 16:30 STOP REQUEST
04 070102 16:45 X PUMP(FAN) FAULT

The state of equipment during trip



8) TRIP AND ALARM

Item	Description	Units	Step	Min	Max	Default	View	Access
400	**Flow sensing delay**	Sec.	1	0	300	60	SVC1	SVC1
401	**Flow sensing hold**	Sec.	1	0	300	5	SVC1	SVC1
402	**Discharge temp over**	℃	1	50	180	115	SVC1	SVC1
403	**Outlet temp freeze**	℃	1	-99	99	3	SVC1	SVC1
404	**Oil flow sensing delay**	Sec.	1	0	300	60	SVC1	SVC1
405	**Oil flow sensing hold**	Sec.	1	0	300	0	SVC1	SVC1
406	**Lo press sensing delay**	Sec.	1	0	300	60	SVC1	SVC1
407	**Lo press sensing hold**	Sec.	1	0	300	5	SVC1	SVC1
408	**Oil level sensing delay**	Sec.	1	0	300	60	SVC1	SVC1
409	**Oil level sensing hold**	Sec.	1	0	300	5	SVC1	SVC1
410	**Condensor fault func.**	Off / On				On	SVC1	SVC1

1) Flow state error fault

◆ Stream detection delay time: Start for perceiving after delay time since a pump(fan) was operated a detection of a stream detection switch. (Be always detections if set up in 0 seconds.)

- ◆ Stream detection operation time: Shall be OFF state during action time, and input of a stream detection switch perceives.(If it is 0 seconds, do not perceive)

2) Outlet temp freeze: A trip function runs hereafter the freezing temperature that exit temperature is excessive.

3) Oil flow error fault
   - ◆ Oil flow delay: Start for perceiving after delay time since a freezer was driven a detection of an oil stream switch. ((Be always detections if set up in 0 seconds)
   - ◆ Oil flow operation time: Shall be OFF state during action time, and input of an oil stream switch perceives. (If it is 0 seconds, do not perceive)

4) Lo press error fault
   - ◆ Lo press sensing delay: Start for perceiving after delay time since a freezer was driven a detection of a low pressure switch. (Be always detections if we set up in 0 seconds)
   - ◆ Lo press sensing time: Shall be OFF state during action time, and input of a low pressure switch perceives (If it is 0 seconds, do not perceive)

5) Oil level error fault
   - ◆ Oil level delay time: Start for perceiving after delay time since a freezer was driven a detection of an oil level switch.(Be always detections if we set up in 0 seconds)
   - ◆ Oil level operation time: Shall be OFF state during action time, and input of an oil level switch perceives. (If it is 0 seconds, do not perceive)

6) Condensor fault func.: If it is an air cooling formula, select whether or not there is by condensor Fan alarm use.

8-1) Trip alarm message

Item	Description	Detect condition
1	**Outlet sens. flt.**	Detection If an error occurred to an exit direction temperature sensor (Breaking of wire) Cancellation If an exit direction temperature sensor is normal
2	**Dc gas sens. flt.**	Detection If an error occurred to an exit direction discharge-gas sensor (Breaking of wire) Cancellation If an exit direction discharge-gas sensor is normal
3	**Pump(fan) fault**	Detection [Digital signal input:ID9:pump(fan)interlock] signal OFF Cancellation [Digital signal input:ID9: pump(fan)interlock] signal ON
4	**Flow fualt**	Detection [Digital signal input:ID8:flow] signal OFF Cancellation [Digital signal input:ID8:flow] signal ON
5	**Comp ocr**	Detection [Digital signal input:ID1: Be detections to over-current of a freezer] signal OFF Cancellation [Digital signal input:ID1: Be detections to over-current of a freezer] signal ON
6	**Phase fault**	Detection [Digital signal input:ID2: Be detections to back current of a freezer] signal OFF Cancellation [Digital signal input:ID2: Be detections to back current of a freezer] signal ON
7	**Low press fault**	Detection [Digital signal input:ID3: A low pressure switch of a freezer] signal OFF Cancellation [Digital signal input:ID3: A low pressure switch of a freezer] signal ON
8	**Hi press fault**	Detection [Digital signal input:ID3: A high pressure switch of a freezer] signal OFF Cancellation [Digital signal input:ID3: A high pressure switch of a freezer] signal ON

9	**Dc gas over-temp**	Detection Discharge-gas temp. > [Trip alarm setting: Excessive temperature setting of discharge-gas] Cancellation Discharge-gas temp <= [Trip alarm setting: Excessive temperature setting of discharge-gas] - 5℃
10	**Outlet freeze**	Detection exit temp. < [Trip alarm setting: An excessive freezing temperature alarm of an exit] Cancellation exit temp. >= [Trip alarm setting: An excessive freezing temperature alarm of an exit] + 2℃
11	**Cond-fan fault**	Detection [Digital signal input:ID7:condenser error] signal OFF Cancellation [Digital signal input:ID7: condenser error] signal ON
12	**Inlet sens. fault**	Detection If an error occurred to an entrance direction temperature sensor (Breaking of wire) Cancellation If an entrance direction temperature sensor is normal
13	**Comp int fault**	Detection [Digital signal input:ID6: An overheating signal of a freezer] signal OFF Cancellation [Digital signal input:ID6: An overheating signal of a freezer] signal ON.
14	**Press sens. fault**	Detection If an error occurred to a pressure sensor (Breaking of wire) Cancellation If a temperature sensor is normal
15	**Ext. t-sens fault**	Detection If An outdoor temperature sensor is an error (Breaking of wire). Cancellation If An outdoor temperature sensor is normal
16	**Cap. Signal fault**	Detection If An external capacity signal is an error. Cancellation If An external capacity signal is normal
17	**System fault**	Detection if a control Parameter value was changed suddenly Cancellation Control Parameter after confirmation

※ **Fault message occurred in is released after removing the cause of corresponding Fault if we press a RESET key.**

9) EXTENT OPERATING SET

Item	Description	Units	Step	Min	Max	Default	View	Access
500	**Running mode**	-	LOCAL / REMOTE CONTROL / RESERVATION			LOCAL	SVC1	SVC1
502	**Control source**	-	IN / OUT / B4 / E-B4 / P-B4			OUT	SVC1	SVC2
503	**Step delay time**	Sec.	1	0	999	10	SVC1	SVC2
504	**Step delay time(start)**	Sec.	1	0	999	180	SVC1	SVC2
507	**Comp. start delay time**	Sec.	1	0	600	5	SVC1	SVC2
508	**Comp. restart delay time**	Min.	1	0	30	5	SVC1	SVC2
509	**Comp. auto stop delay**	Sec.	1	0	600	5	SVC1	SVC2
510	**Comp. stop delay**	Sec.	1	0	600	5	SVC1	SVC2
511	**Start sol off delay**	Sec.	1	0	600	30	SVC1	SVC2
512	**Pump(fan) off delay**	Min.	1	0	30	0	SVC1	SVC2
513	**Y/D,P/W change time**	Sec.	0.1	0.1	30.0	5.0	SVC1	SVC2
514	**Pump-down set**	Sec.	1	0	600	0	SVC1	SVC2
515	**Blackout return func.**	-	OFF / ON			ON	SVC1	SVC2
516	**System address setting****	-	1	1	128	1	SVC1	SVC2
517	**Local address setting****	-	1	1	128	1	SVC1	SVC2
518	**System communication speed ****	-	4800, 9600, 19200, 38400			9600	USER2	USER2
519	**Local communication speed ****	-				9600	USER2	USER2

***** The function that can communicate with was installed, and be marked.***

1) Running mode: local(Use keypad of a controller), remote control(Use digital input ID10), reservation (Use schedule operation)
2) Control source : control source setting (IN: entrance temperature, OUT: exit temperature, B4: outdoor temperature , E-B4: outdoor capacity, P-B4: low pressure control) B4, E-B4, P-B4 is 4~20mA input style
3) Comp. start delay time: ON does liquid stream valve and operation valve, and a compressor sets up time of operation
4) Comp restart delay time: Compressor set up after OFF, and it is possible a driving compressor since time was passed
5) Comp. auto stop delay: A compressor sets up the time that is condition that is OFF, delay time (By temperature)
6) Comp. stop delay: The time that is condition that a compressor is OFF, delay time (By keypad, digital input ID10 etc)
7) Start sol off delay: ON sets later up time to operating-valve a compressor until select OFF
8) Pump(fan) off delay: Set up circulation driving time of pump(fan)
9) Pump-down set: Set the pump-down time of freezer
10) Blackout return func.:After a stoppage of power supply, set return or not previous Operation/stop

10) CONFIGURE

※ Should change a setting number since a grasp called exactly a characteristic.

※ Perfection shall be stopped, and setting is possible equipment.

Item	Description	Units	Step	Min	Max	Default	View	Access
612	**Comp. start method**	Direct / YDelta / PWinding				YDelta	SVC1	SVC2
613	**Inlet temp sensor**	OFF / ON				OFF	SVC1	SVC2
614	**Outlet temp sensor**					ON	SVC1	SVC2
615	**Discharge temp sensor**					ON	SVC1	SVC2
617	**Injection sol type**	OFF / ON				ON	SVC1	SVC2
621	**Start capcity method**	1 - CR1:OFF, CR2:OFF, CR3:OFF 2 - CR1:OFF, CR2:OFF, CR3:ON 3 - CR1:OFF, CR2:ON, CR3:OFF 4 - CR1:OFF, CR2:ON, CR3:ON 5 - CR1:ON, CR2:OFF, CR3:OFF 6 - CR1:ON, CR2:OFF, CR3:ON 7 - CR1:ON, CR2:ON, CR3:OFF 8 - CR1:ON, CR2:ON, CR3:ON 9 – NONE				2	SVC1	SVC2
622	**50% capcity method**					3	SVC1	SVC2
623	**75% capcity method**					5	SVC1	SVC2
624	**100% capcity method**					1	SVC1	SVC2

1) Compressor maker selection: Set up a control method.
   A capacity control method, a compressor operating method is set up automatically.
2) Select compressor operating method: Select operating method.
3) Entrance/exit/discharge-gas temperature sensor selection: Set up whether or not there is by a port of the temperature sensor which it was installed and use.
   Use injection valve: Set up whether or not there is by use of a liquid spray valve.
4) Configuration of an action to control capacity: operating/50%/75%/100% Select valve configuration of an action to control capacity.
5) capacity control does not call if we set up to NONE in Configuration of an action Relevant to control capacity.

11) CALIBRATION

Item	Description	Units	Step	Min	Max	Default	View	Access
700	**Inlet temp sensor cal**	℃	1	-20.0	+20.0	0.0	USER 2	USER 2
701	**Outlet temp sensor cal**	℃	1	-20.0	+20.0	0.0	USER 2	USER 2
702	**Discharge-gas temp cal**	℃	1	-20.0	+20.0	0.0	USER 2	USER 2
703	**Press sensor cal**	Bar	1	-20.0	+20.0	0.0	USER 2	USER 2
704	**Press sensor range lo**	Bar	1	-1	+100	0	USER 2	USER 2
705	**Press sensor range hi**	Bar	1	-1	+100	30	USER 2	USER 2
706	**Exit temp sensor cal**	℃	1	-20.0	+20.0	0.0	USER 2	USER 2
707	**Exit temp sensor lo**	℃	1	-50	+200	-20	USER 2	USER 2
708	**Exit temp sensor hi**	℃	1	-50	+200	80	USER 2	USER 2

1) Inlet temp sensor cal: Input a revision price of an entrance temperature sensor.
2) Outlet temp sensor cal: Input a revision price of an exit temperature sensor.
3) Discharge-gas temp cal: Input a revision price of a discharge-gas temperature sensor.
4) Press sensor range lo: Input an inferior limit price of a pressure sensor.
5) Press sensor hi: Input an upper limit price of a pressure sensor.

12) TEST MODE

Accessible right: SVC1, Changeable right: SVC2

Item	Description	Units	Step	Min	Max	Default
1000	**Manual test mode**	-	ON / OFF			OFF
1001	**Cr1 capacity sol**	-	ON / OFF			OFF
1002	**Cr2 capacity sol**	-	ON / OFF			OFF
1003	**Cr2 capacity sol**	-	ON / OFF			OFF
1004	**Main Liquid sol**	-	ON / OFF			OFF
1005	**Comp MM•PW1**	-	ON / OFF			OFF
1006	**Comp MY•PW2**	-	ON / OFF			OFF
1007	**Comps MD**	-	ON / OFF			OFF
1008	**Injection sol**	-	ON / OFF			OFF
1009	**Spare**	-	ON / OFF			OFF
1010	**Run state**	-	ON / OFF			OFF
1011	**Total alarm**	-	ON / OFF			OFF
1012	**Pump(Fan) control**	-	ON / OFF			OFF

1) Manual operation is possible in stop state only.

2) MS (Star Magnet) and MD(Delta Magnet) cannot operate at a same time.

13) FACTORY SET

※ This is the set mode when delivered thus, please understand exactly and then, changes it.

Item	Description	Units	Step	Min	Max	Default	View	Access
900	**Self test**		NO / YES			NO	SVC2	SVC3
901	**Log clear**		NO / YES			NO	SVC2	SVC3
902	**Info clear**		NO / YES			NO	SVC2	SVC3
903	**B1 Input**		Only View			997	SVC2	-
904	**B2 Input**					280	SVC2	-
905	**B3 Input**					997	SVC2	-
906	**B4 Input**					280	SVC2	-
907	**B5 Input**					997	SVC2	-
908	**B4 4mA set**		1	0	1023	280	SVC2	SVC3
909	**B4 20mA set**					997	SVC2	SVC3
910	**B5 4mA set**					280	SVC2	SVC3
911	**B5 20mA set**					997	SVC2	SVC3
912	**Y1 4mA set**		1	0	9999	810	SVC2	SVC3
913	**Y1 20mA set**					3510	SVC2	SVC3
914	**Y2 4mA set**					810	SVC2	SVC3
915	**Y2 20mA set**					3510	SVC2	SVC3
916	**Y3 4mA set**					810	SVC2	SVC3
917	**Y4 20mA set**					3510	SVC2	SVC3
918	**ADC filter**		1	1	256	8	SVC2	SVC3
919	**DAC filter**		1	1	256	8	SVC2	SVC3

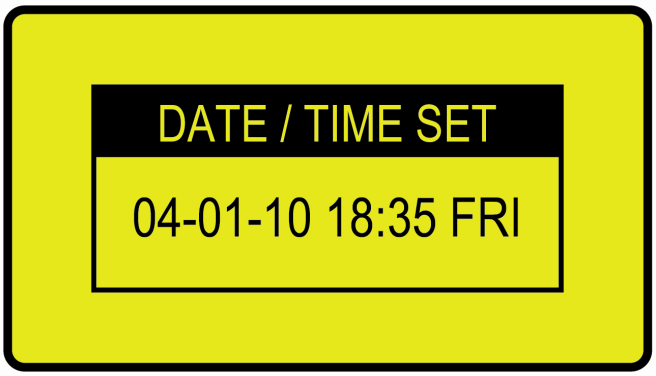
This product has a digital control function in terms of a digital Input/Output function.
When customer wants the change something, please contact to [DOTECH] company.

1) Self test: It is set 'ON', when taking test or delivered.
2) Log clear: Use to delete Trip Warning Background.
3) Info clear: Use to delete Operation Background.
4) Bn 4mA: Analog Input(4mA)
5) Bn 20mA: Analog Input (20mA)
6) Yn 4mA: A constant of change Analog signal (4mA)
7) Yn 20mA: A constant of change Analog signal (20mA)

14) SYSTEM DATE/TIME

Date/time is used for a report of system information by trip/state report and schedule operation. Thus, it is necessary for a trouble or an abnormal condition. Please set date/time.

1) Put menu button once on the main display, see the display to set access code.
2) Put menu button once again, see the display to set the date/time like below
3) Set date/time with controlling up/down and enter button, then put [cancel] button for returning to main display
4) The day of a week will be set automatically
5) If ":" between hour and minute does not flicker, set all once again.



<Date/time setting screen>

5. INSTALLATION PROCESS

1) INSTALLATION PLACE

Please set this product up in the place mentioning below.

⊙ Low temperature change or normal temperature
⊙ No corrosiveness gas
⊙ No low and high humid
⊙ Low machinery vibration
⊙ Low dirt or smoke
⊙ Low effect from an electrical noise
⊙ No effect from a strong magnetic field

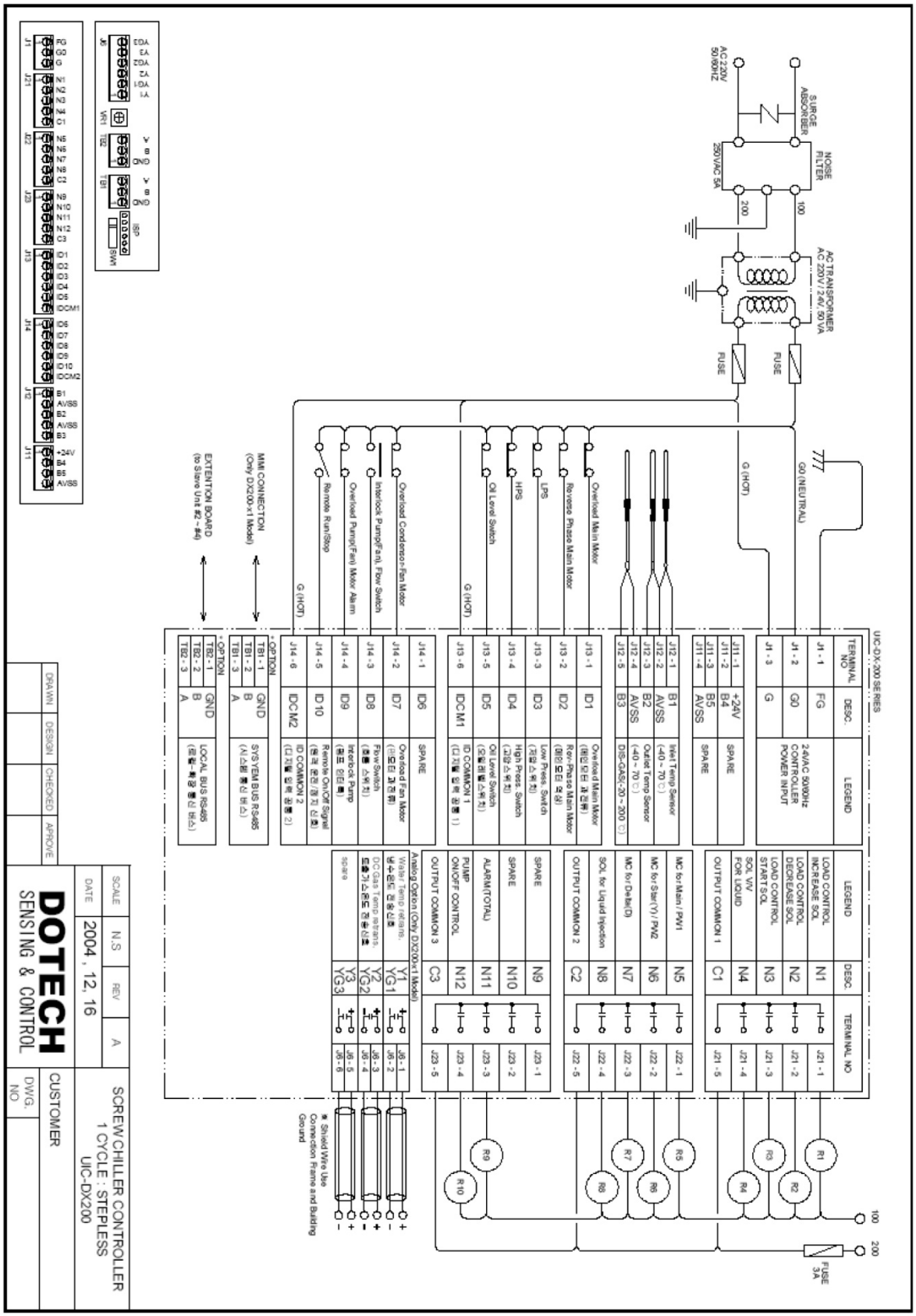
2) INSTALLATION PROCESS

⊙ Set up within a slop of fifteen degrees
⊙ Use a steel plate over 2mm as panel
⊙ Do not set up by force
⊙ Fasten the product with an included screw

3) BE WARNING MATTERS ACID CONNECTION WITH LINES

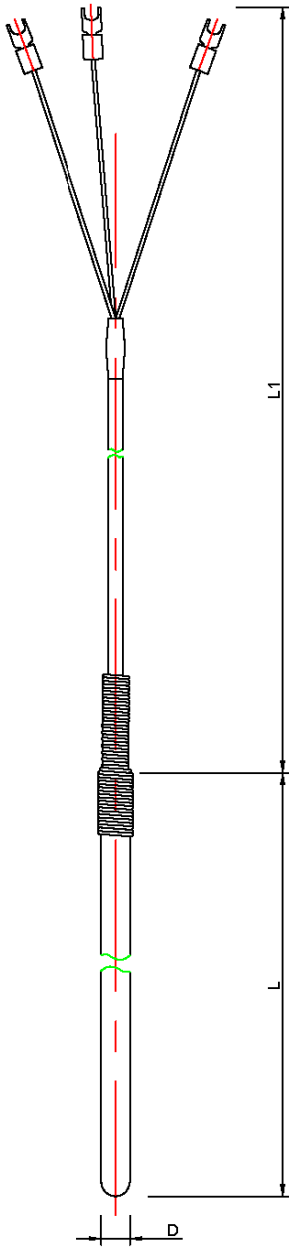
⊙ Please use the shield cable for between control board and sensor to prevent a noise
⊙ Keep input/output Line away over 30cm from Power Line and do not put same lines together
⊙ Set fuse apart to protect the product from overvoltage
⊙ For a high safety, connect parallel Serge Observer to Magnet Coil
⊙ For a high safety, use noise filter

6. ELECTRIC DRAWING



7. SENSOR DATA

1) TEMPERATURE SENSOR DATA



ELEMENTS

SENSOR
- ☐ NTC502AT,SEMITEC,B3324K±1%
- ☑ NTC103CT4,SEMITEC,B3270K±2%
- ☐ RTD, PT100Ω
- ☐ RTD, PT1000Ω
- ☐ OTHER [ ]

PROTECTION TUBE

MATERIAL
- ☑ SUS-304 ☐ SUS-316
- ☐ OTHER [ ]

OUT-DIA (Dmm)
- ☐ 3.0 ☐ 4.0 ☐ 5.0
- ☑ 6.0 ☐ 8.0 ☐ 10.0
- ☐ OTHER [ ]

LENGTH(L)
- ☐ _____ mm

LEAD-WIRE SPEC.

MATERIAL
- ☐ PVC ☑ TEFLON
- ☐ OTHER [ ]

NUMBER OF LEADWIRE
- ☑ 2 WIRE ☐ 3 WIRE
- ☐ 4 WIRE ☐ 6 WIRE

COVER MATERIAL
- ☐ NONE
- ☑ METAL SHIELD
- ☐ FLEXIBLE TUBE

LENGTH(L1)
- ☐ _____ mm

Discharge-gas temperature sensor only.

Sensor model: DPR-TH02-P6D100L*3m

Use temperature: -50 ~ 250 ℃

Sensor thickness: 6mm, sensor length: 100mm, wire length: 3m

※ The thickness and the length, the wire length an order working drawing are possible.